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# Upper Lillooet River Hydroelectric Project: The Challenges of Constructing a Power Tunnel for Run-of-River Hydro Projects in Mountainous British Columbia

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## ABSTRACT
The Upper Lillooet River Hydroelectric Project (ULHP) is a run-of-river power generation scheme located near Pemberton, British Columbia, Canada, consisting of two separate hydroelectric facilities (HEFs) with a combined capacity of 106.7 MW. These HEFs are owned by the Upper Lillooet River Power Limited Partnership and the Boulder Creek Power Limited Partnership, and civil and tunnel construction was completed by CRT-ebc. The Upper Lillooet HEF includes the excavation of a 6 m wide by 5.5 m high and approximately 2500 m long tunnel along the Upper Lillooet River Valley. The project is in a mountainous area; severe restrictions imposed by weather conditions and the presence of sensitive wildlife species constrained the site operations in order to limit environmental impacts. The site is adjacent to the Mount Meager Volcanic Complex, the most recently active volcano in Western Canada. Tunneling conditions were very challenging, including a section through deposits associated with the most recent eruption from Mount Meager Volcanic Complex (~2360 years before the present). This tunnel section included welded breccia and unconsolidated deposits composed of loose pumice, organics (that represent an old forest floor), and till, before entering the underlying tonalite bedrock. The construction of this section of the tunnel required cover grouting, umbrella support, and excavation with a combination of roadheader, hydraulic hammer, and drilling and blasting method. This paper provides an overview of the project, a summary of the key design and construction schedule challenges, and a description of the successful excavation of the tunnel through deposits associated with the recent volcanic activity.

## 1. Introduction